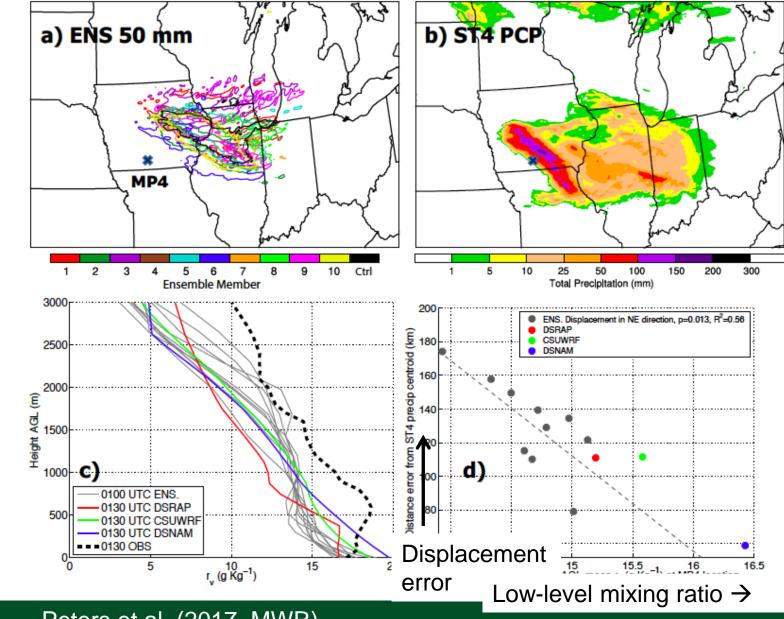
Simulations show that precipitation forecasts are especially sensitive to water vapor and its vertical profile

Field observations reveal important errors in moisture profiles in operational analyses and forecasts

Can new observations (remote sensing of moisture, etc.) lead to improvements in rainfall forecasts?



Peters et al. (2017, MWR)

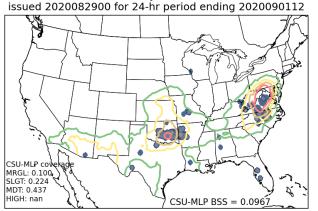
We know that post-processing of numerical model output (using machine learning or other techniques) works well for the short range through the medium range

How far can these methods extend the skill? What new methods can be developed for S2S timescales?

## CSU-MLP forecasts & obs

CSU-MLP day3 & UFVS obs

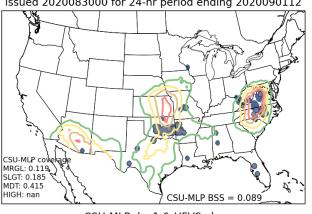
## WPC forecasts & obs



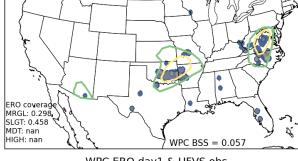
WPC ERO day3 & UFVS obs issued 2020082909 for 24-hr period ending 2020090112

ERO coverage MRGL: 0.174
SLGT: 0.192
MDT: nan HIGH: nan
HIGH: nan

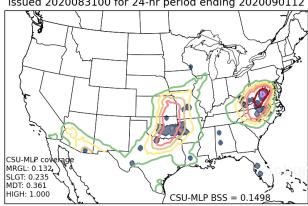
CSU-MLP day2 & UFVS obs issued 2020083000 for 24-hr period ending 2020090112



WPC ERO day2 & UFVS obs issued 2020083009 for 24-hr period ending 2020090112



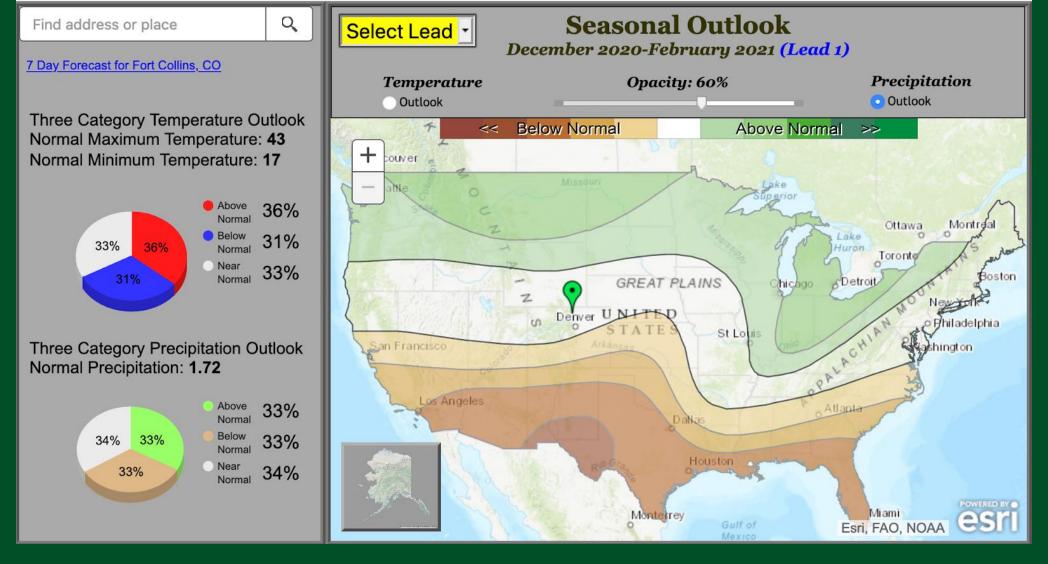
CSU-MLP day1 & UFVS obs issued 2020083100 for 24-hr period ending 2020090112



WPC ERO day1 & UFVS obs issued 2020083109 for 24-hr period ending 2020090112



Based on Herman et al. (2018a,b)



In Colorado and the west, there is a major reliance on subseasonal to seasonal outlooks, but they aren't always very good (and can be confusing to users.) Where can we make progress on this challenging issue?